



BILLING CODE: 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XA691

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Seismic Survey in Cook Inlet, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of incidental take authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to the Apache Alaska Corporation (Apache) to take marine mammals, by harassment, incidental to a proposed 3D seismic survey in Cook Inlet, Alaska, between April 2012 and April 2013.

DATES: Effective April 30, 2012, to April 30, 2013.

ADDRESSES: A copy of the IHA and application are available by writing to Jolie Harrison, Incidental Take Team Supervisor, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910 or by telephoning the contacts listed here.

A copy of the application used in this document may be obtained by writing to the address specified above, telephoning the contact listed below (see FOR FURTHER INFORMATION CONTACT), or visiting the internet at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm>. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Brian D. Hopper, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental taking of small numbers of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring and reporting of such takings. NMFS has defined “negligible impact” in 50 CFR 216.103 as “...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed

authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [“Level A harassment”]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [“Level B harassment”].

Summary of Request

NMFS received an application on June 15, 2011, from Apache for the taking, by harassment, of marine mammals incidental to a 3D seismic survey program in Cook Inlet, Alaska. After addressing comments from NMFS, Apache modified its application and submitted a revised application on July 19, 2011. The July 19, 2011, application was the one available for public comment (see ADDRESSES) and considered by NMFS for this IHA. On September 21, 2011, NMFS published a notice in the Federal Register (76 FR 58473) discussing the effects on marine mammals and making preliminary determinations regarding a proposed IHA. The notice initiated a 30 day public comment period, which closed on October 21, 2011.

Apache’s 3D seismic surveys would employ the use of two source vessels. Each source vessel will be equipped with compressors and 2400 in³ airgun arrays, as well as additional lower-powered and higher frequency survey equipment for collecting bathymetric and shallow sub-bottom data. In addition, one source vessel will be equipped with a 440 in³ shallow water airgun array, which it can deploy at high tide in the intertidal area in less than 1.8 m of water. The proposed survey will take place in Cook Inlet. During the effective period of the IHA, Apache

anticipates conducting seismic surveys to cover an $\sim 829 \text{ km}^2$ ($\sim 320 \text{ mi}^2$) area along the west coast of Cook Inlet from the McArthur River up and to the south of the Beluga river, in water depths of 0–128 m (0–420 ft). Apache intends to conduct transition zone marine surveys near intertidal areas in water depths of 0–54 m (0–177 ft) beginning in April 2012 and concluding in November 2012. Offshore areas will be surveyed in between April and September 2012 in water depths of 54–128 m (177–420 ft). Apache expects that it will take approximately 160 days – 60 days in the nearshore region and 100 days in the offshore region - over the course of 8–9 months to complete the survey. Impacts to marine mammals may occur from noise produced from active acoustic sources (primarily airguns) used in the surveys. There is also an onshore area that will be surveyed; however, this MMPA authorization only addresses takes from in-water activities because a sound source verification (SSV) study conducted in September 2011 indicated that in-water noise levels from explosive detonations onshore will not rise to a level of that would be anticipated to result in harassment of marine mammals in the water.

Description of the Specified Activity

In 2010, Apache acquired over 300,000 acres of oil and gas leases in Cook Inlet with the primary objective to explore for and develop oil fields. In the spring of 2011, Apache conducted a seismic test program to evaluate the feasibility of using new nodal (i.e., no cables) technology seismic recording equipment for operations in the Cook Inlet environment and to test various seismic acquisition parameters to finalize the design for a 3D seismic program in Cook Inlet. The test program took place in late March 2011 and results indicated that the nodal technology was feasible in the Cook Inlet environment. Apache proposes to conduct a phased 3D seismic survey program throughout Cook Inlet over the course of the next three to five years. The first area proposed to be surveyed – and the subject of this IHA – is located along the western coast of

mid-Cook Inlet.

The survey operations will be performed from multiple vessels. Apache will employ the use of two source vessels. Each source vessel will be equipped with compressors and 2400 in³ airgun arrays. In addition, one source vessel will be equipped with a 440 in³ shallow water airgun array, which it can deploy at high tide in the intertidal area in less than 1.8 m of water. Three shallow draft vessels will support cable/nodal deployment and retrieval operations, and one mitigation/chase vessel will be used, which will also provide berthing for the Protected Species Observers (PSOs). Finally, two smaller jet boats will be used for personnel transport and node support in the extremely shallow water of the intertidal area. For additional information, such as vessel specifications, see Apache's application.

To cover ~829 km², the survey will take approximately 160 days to complete over the course of 8-9 months. Apache anticipates conducting survey operations 24 hours per day. During each 24 hour period, seismic operations will be active; however, in-water airguns will only be used for approximately 2.5 hours during each of the slack tide periods. There are approximately four slack tide periods in a 24-hour day, therefore, airgun operations will be active during approximately 10-12 hours per day, if weather conditions allow.

NMFS outlined the purpose of the program in a previous notice for the proposed IHA (76 FR 58473, September 21, 2011). The activities to be conducted have not changed between the proposed IHA notice and this final notice announcing the issuance of the IHA. For a more detailed description of the activity, including vessel and acoustic source specifications, the reader should refer to the proposed IHA notice (76 FR 58473, September 21, 2011), the IHA application and associated documents referenced above this section.

Comments and Responses

A notice of receipt of the Apache application and proposed IHA was published in the Federal Register on September 21, 2011 (76 FR 58473). During the 30-day public comment period, NMFS received comments from the Marine Mammal Commission (Commission), the Alaska Department of Fish and Game, environmental non-governmental organizations (NGOs), and one member of the public. Following are their comments and NMFS's responses:

Comment 1: The Commission recommended that NMFS require the applicant to re-estimate the ensonified areas for each sound threshold (i.e., 190, 180, and 160 dB re 1 μ Pa) and the expected number of marine mammal takes, accounting for simultaneous, alternating use of two sound sources and the overlap of their acoustic footprints.

Response: The two source vessels will survey the area using a "ping/pong" technique. This method does not require the two vessels to fire their airgun arrays simultaneously. Instead, the first vessel fires the initial shot and then the second vessel fires its array about 12 seconds later. The first vessel would then fire its second shot 12 seconds after the second vessel has fired its airguns and so on. No other sources will be active at the same time as the airgun arrays because any additional sources may compromise the collection of seismic data from the airguns. As described in Section 6.2 of the IHA application, acoustic impacts were calculated based on the largest sound source, the 2400 in³ array, and included the ping/pong survey method described above. The calculations were performed for a 24-hour period of seismic survey activity. The estimated takes predicted with the 24-hour calculations factored in the 24-hour acoustic footprint, the estimated number of days surveyed in the respective depths, and the estimated marine mammal abundances.

Comment 2: The Commission recommended that NMFS require the applicant to describe and provide the rationale for the method used to determine the density estimate for

beluga whales away from river mouths and recalculate the density estimates accordingly.

Response: The abundance estimate for belugas was derived from the highest daily mean count acquired during the annual surveys (i.e., the highest number of individuals observed in the area over the entire survey period). As noted in Section 6.3 of the IHA application, belugas are found in much higher concentrations in river mouths (e.g., Chickaloon Bay and Susitna Delta) compared to other areas. The applicant used the average number of belugas for the non-river mouths as a conservative estimate; however, in response to the Commission's recommendation, Apache has removed the Chickaloon Bay and Susitna Delta highest daily mean counts and recalculated the maximum number of belugas observed, which results in higher abundance estimates for non-river mouths. The revised average density is 0.00012 with a maximum of 0.00037 for non-river mouths.

Comment 3: The Commission recommended that NMFS require the applicant to recalculate the estimated number of takes for all species based on the modeled areas of ensonification for each sound threshold (i.e., 190, 180, and 160 dB re μ 1 Pa), using the full number of survey days rather than half that number.

Response: The acoustic footprints were calculated on a 24-hour basis, but surveys will only take place 12 hours per day; therefore, authorization for marine mammal takes incidental to the seismic survey will only be necessary during 12 hours per day when surveys are conducted. In-water airguns will only be active for approximately 2.5 hours during periods of slack tide. There are approximately 4 slack tide periods every 24 hours; therefore, airguns will be active approximately 10-12 hours per day, if weather conditions allow. Apache anticipates that a crew can acquire approximately 5.2 km² per day, assuming an efficient crew can work 10-12 hours per day.

Comment 4: The Commission recommended that NMFS require the applicant to either amend its application to seek authorization to take the full number of marine mammals that may be taken or provide sufficient justification for requesting lesser numbers of takes, particularly for beluga whales and harbor seals.

Response: The application and NMFS' IHA authorize take for the total taking estimated. Estimating take begins with a mathematical formula, but may be adjusted upward or downward to account for factors such as effects of mitigation and monitoring and species group size. See the section in this Federal Register notice titled Estimated Take by Incidental Harassment, which has been updated for increased clarity, for an explanation of how take estimates were calculated for this activity.

Comment 5: The Commission recommended that NMFS ensure that the monitoring measures included in the authorization are sufficient to account for all takes of marine mammals and require the applicant to provide timely reports of the number of marine mammals taken so that surveys can be stopped before the authorized takes are exceeded.

Response: For this project, the required marine mammal monitoring serves two primary purposes. One purpose is to trigger mitigation measures – so when a marine mammal is sighted within or entering the identified 180 or 190 dB exclusion zones, appropriate measures are taken to minimize the likelihood that marine mammals are exposed to injurious sound levels; and under certain circumstances, mitigation action will be taken when marine mammals are sighted within or approaching the 160 dB zone. The second purpose is to collect data regarding the behavior and numbers of marine mammals detected within the 160 dB zone, which can be used to refine Level B harassment take estimates and contributes to our understanding of the nature and scale of marine mammals behavioral responses to seismic surveys. To better account for

marine mammal takes that occur during the survey and ensure that takes do not exceed the amount authorized in the IHA, NMFS has included an additional reporting requirement in the IHA that will require the applicant to submit weekly and monthly reports to the Permits and Conservation Division. These reports will contain information regarding the species detected, in-water activity occurring at the time of the sighting, behavioral reactions to in-water activities, and the number of marine mammals taken. NMFS believes that the inclusion of a weekly and monthly reporting requirement will allow both NMFS and Apache to regularly track the number and nature of marine mammal takes, and ensure that takes do not exceed what is authorized by the IHA. In addition, following the completion of the survey, Apache will submit a draft report on all activities and monitoring results to the Office of Protected Resources within 90 days of the completion of the Apache survey.

Comment 6: Environmental NGOs commented that NMFS should not rely on its regulatory definition of “small numbers” that was found to be improper by a U.S. District Court in Natural Resources Defense Council v. Evans, 279 F.Supp. 2d 1129 (N.D. Ca. 2003). They also commented that the take of 30 Cook Inlet beluga whales is not a “small number” for such an isolated, endangered population.

Response: NMFS does not rely on the 1982 regulatory definition of small numbers for its incidental take authorizations. Instead, NMFS addresses “small numbers” in terms relative to the stock or population size. Apache requested, and NMFS authorizes, the take of 30 Cook Inlet beluga whales by Level B harassment, which represents about 10 percent of the population if one assumes that each take is a separate individual animal. In addition, the percentage would be even lower if animals make minor course adjustments to avoid the approaching seismic survey area in a manner that does not result in take at all. Additionally, the requirement to cease operating

when cow-calf pairs or groups of 5 or more animals enter the 160dB zone is likely to further reduce the number of individuals taken. NMFS has determined that the small numbers requirement has been satisfied for this IHA. The status of the Cook Inlet beluga population (i.e., the fact that it is an isolated, endangered population) has been carefully considered in NMFS' negligible impact analysis.

Comment 7: Environmental NGOs commented that NMFS's assumption that marine mammals will not be harassed by sounds below 160 dB re 1 μ Pa (rms) is arbitrary and not supported by science. The NGOs support their comment by providing as an example the sensitivity of harbor porpoises to noise and NMFS's use of 120 dB as a threshold when authorizing take incidental to Navy sonar activities. In addition, the commenters refer to a recent decision document related to seismic surveys in the Chukchi Sea where NMFS imposed a 120 dB safety zone for aggregations of bowhead whales.

Response: NMFS does not agree with the commenter's assessment of the 160 dB threshold. NMFS uses 160 dB for most species in most cases based on the best available information. NMFS established the current Level B harassment (sub-injurious) thresholds for underwater sound sources (except explosives and tactical active sonar) based on measured avoidance responses observed in whales in the wild. Specifically, the 160 dB threshold was derived from data for mother-calf pairs of migrating gray whales (Malme et al., 1983, 1984) and bowhead whales (Richardson et al., 1985, 1986) responding to seismic airguns (e.g., impulsive sound source). This threshold has been applied to a variety of activities, such as seismic surveys and impact pile driving.

Regarding the 120 dB threshold for the onset of behavioral harassment for harbor porpoises by Navy sonar activities, that threshold is limited to exposure to mid- and high-

frequency sonar signals, which are defined as sound with dominant frequency at 1-10 kHz and above 10 kHz, respectively. In contrast, sounds produced during marine seismic surveys have most of their energy concentrated at the lower end of the frequency spectrum, which is largely outside of the frequency range where harbor porpoises have the highest sensitivity (Anderson 1970; Kastelein et al. 2002). Harbor porpoises are considered sensitive species that respond to active sonar signals at lower received levels than other species in a manner that NMFS considers Level B harassment. Therefore, NMFS believes that it is scientifically justifiable to use received level at 120 dB as the threshold for behavioral harassment for harbor porpoises exposed to mid- and high-frequency Navy sonar, but it is not appropriate to use this received level as the threshold for behavioral harassment for harbor porpoises or other marine mammal species when exposed to sounds from seismic surveys. NMFS continues to believe that the 160 dB threshold is appropriate for determining the level of take of marine mammals by Level B harassment for impulse noise (such as from airguns).

Separately, the comment about mitigation measures for aggregations of bowheads is incorrect. NMFS has included shutdown measures at the 160 dB threshold for aggregations of bowheads in the Arctic during seismic surveys, but not 120 dB. Moreover, this measure was required to ensure no unmitigable adverse impact on the availability of bowheads for subsistence uses, pursuant to the MMPA, not strictly as a means to effect the least practicable impact on bowhead whales. Bowhead whales, hunted by Alaska Natives, are low-frequency hearing specialists (unlike any of the species in Cook Inlet) and the frequency of seismic airguns falls within the frequency range of their highest sensitivity. During migration, they may respond to received levels below 160dB in a manner that could potentially interfere with a subsistence hunt (e.g., causing a minor deflection in their migratory path), but which NMFS would not consider

harassment. In addition, these minor course changes occurred during migration and have not been seen at other times of the year and during other activities.

Comment 8: Environmental NGOs commented that because the status of Cook Inlet beluga whales is so tenuous, NMFS cannot conclude that the activities that will harass a significant portion of the population will have no more than a negligible effect on the stock.

Response: NMFS took into account the status of Cook Inlet beluga whales as well as other factors in making its negligible impact determination, as explained in this Federal Register Notice. NMFS used the best scientific information to support the analyses for its preliminary determination in its proposed IHA notice (76 FR 58473, September 21, 2011) and its final determination presented in this Federal Register notice.

Comment 9: Environmental NGOs commented that NMFS cannot make a negligible impact finding because the agency has failed to address the likely impact of a large scale stranding event caused by Apache's activities.

Response: Marine mammals close to underwater detonations of high explosive can be killed or severely injured, and the auditory organs are especially susceptible to injury (Ketten et al. 1993; Ketten 1995). Air gun pulses are less energetic and their peak amplitudes have slower rise times. To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to air gun pulses, even in the case of large air gun arrays.

However, in numerous past IHA notices for seismic surveys, commenters have referenced two stranding events allegedly associated with seismic activities, one off Baja California and a second off Brazil. NMFS has addressed this concern several times, and, without new information, does not believe that this issue warrants further discussion. For information relevant to strandings of marine mammals, readers are encouraged to review NMFS' response to

comments on this matter found in 69 FR 74905 (December 14, 2004), 71 FR 43112 (July 31, 2006), 71 FR 50027 (August 24, 2006), and 71 FR 49418 (August 23, 2006). In addition, a May–June 2008, stranding of 100–200 melon-headed whales (Peponocephala electra) off Madagascar that appears to be associated with seismic surveys is currently under investigation (IWC 2009).

It should be noted that strandings related to sound exposure have not been recorded for marine mammal species in Cook Inlet. NMFS notes that beluga whale strandings in Cook Inlet are not uncommon; however, these events often coincide with extreme tidal fluctuations (“spring tides”) or killer whale sightings (Shelden et al., 2003). No strandings or marine mammals in distress were observed during the 2D test survey conducted by Apache in March 2011 and none were reported by Cook Inlet inhabitants. As a result, NMFS does not expect any marine mammals will incur serious injury or mortality in Cook Inlet or strand as a result of the proposed seismic survey.

Comment 10: Environmental NGOs commented that the MMPA’s negligible impact standard requires NMFS to consider the effects of the proposed seismic activities on Cook Inlet beluga whales together with all other activities that affect belugas in Cook Inlet and not issuing an Environmental Assessment (EA) or Environmental Impact Statement (EIS) in advance of proposing to issue an IHA makes it impossible for the public to know whether cumulative effects have been properly considered.

Response: Section 101(a)(5)(D) of the MMPA requires NMFS to make a determination that the harassment incidental to a specified activity will have a negligible impact on the affected species or stocks of marine mammals, and will not result in an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses. Neither the MMPA nor NMFS’ implementing regulations specify how to consider other activities and their impacts on

the same populations. However, consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into the negligible impact analysis via their impacts on the environmental baseline (e.g., as reflected in the density/distribution and status of the species, population size and growth rate, and ambient noise).

In addition, cumulative effects were addressed in the Environmental Assessment and biological opinion prepared for this action, both of which NMFS indicated would be completed prior to the issuance of an IHA (76 FR 58473). These documents, as well as the Alaska Marine Stock Assessments and the most recent abundance estimate for Cook Inlet beluga whales (Hobbs et al. 2011), are part of NMFS' Administrative Record for this action, and provided the decision maker with information regarding other activities in the action area that affect marine mammals, an analysis of cumulative impacts, and other information relevant to the determination made under the MMPA.

Comment 11: Environmental NGOs commented that given the very low subsistence take of Cook Inlet beluga whales in recent years, the injury or mortality of a single beluga by Apache's activities could preclude any subsistence harvest; therefore, NMFS cannot conclude that the incidental take does not have "an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses" by Alaska Natives.

Response: Unmitigable adverse impact means an impact resulting from the specified activity: (1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meeting subsistence needs by: (i) causing the marine mammal to abandon or avoid hunting areas; (ii) directly displacing subsistence users; or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by

other measures to increase the availability of marine mammals to allow subsistence needs to be met. Currently there is no subsistence hunting of Cook Inlet belugas authorized (73 FR 60976, October 15, 2008). Apache did not request and NMFS does not anticipate, nor is it authorizing, any Level A harassment takes of Cook Inlet beluga whales or takes by mortality incidental to the seismic surveys. The required mitigation and monitoring measures are designed to avoid exposing any marine mammals, including Cook Inlet beluga whales, to sound levels that may result in injury; therefore, NMFS believes that any adverse impact from the specified activity can be mitigated. For example, protected species observers will monitor the marine mammal exclusion zone while a sound source is active and have the authority to require power-downs or shut-downs to ensure that Level A harassment takes do not occur. In the unlikely event that marine mammals do get exposed to injurious levels of sound, the IHA will require Apache to cease work and report the incident to NMFS.

Comment 12: Environmental NGOs commented that NMFS should reconsider allowing Apache to continue seismic surveys during nighttime (low light) and other low visibility conditions.

Response: Section 101(a)(5)(D) of the MMPA requires NMFS to prescribe means of effecting the least practicable impact on marine mammal species or stocks. With respect to Apache's seismic survey, (1) marine mammals would need to be within about 330 m of the 10 cubic inch "mitigation" airgun to be exposed to the 160 dB and within about 33 m to be exposed to injurious levels of sound; (2) the approaching airgun arrays, source vessels, and support vessels preclude or discourage marine mammals from entering the action area by alerting animals to the presence of the activity; and (3) the continuous operation of the mitigation airgun at night if survey shooting is to occur at night will alert marine mammals to the presence of

survey vessels in the area, which allows them the opportunity to move away before being exposed to injurious levels of sound.

With respect to practicability, NMFS believes that requiring Apache to halt seismic surveys during nighttime and other low visibility conditions would increase the amount of time it would take Apache to complete the survey and may require additional survey vessels to be brought into Cook Inlet. As a result, NMFS considers the implementation of this recommendation as a mitigation measure to be impracticable for both economic and practical reasons.

However, to further enhance the detection of marine mammals, passive acoustic monitoring (PAM) systems will be deployed, if ice conditions allow, inside the 180/190 dB safety zone in both the up-inlet and down-inlet directions. The fixed system will include two JASCO Advanced Multichannel Acoustic Recorders that send real-time acoustic data via digital UHF radio-broadcast systems to PAM operators aboard the M/V Dreamcatcher. If ice is present, the PAM system can be deployed from the vessel. The PAM operators use specialized real-time detection software and audio playback to detect marine mammal sounds. If PAM operators detect a marine mammal vocalizing, they are authorized to instruct Apache to initiate a shut-down or power down of airguns. If a shut-down occurs at night, seismic surveys will be suspended until the following day and the full safety zone is visible.

Moreover, as stated in the Federal Register notice proposing the IHA, at night, the vessel captains and crews will maintain lookout for marine mammals and will order the airgun(s) to be shut down if marine mammals are observed in or about to enter the safety radii. As with shut down initiated by acoustic detection of marine mammals at night, if a shut down occurs, survey activities will be suspended until the following day and will only be resumed if the full safety

zone is visible. At that point, the ramp-up requirement for airguns and other seismic equipment during normal visual conditions is expected to keep marine mammals from entering the established safety zones.

Comment 13: Environmental NGOs commented that NMFS must examine the practicability of including additional mitigation measures, such as time/area restrictions on the proposed activities, based on marine mammal activity and habitat use.

Response: NMFS considered including time/area restrictions. Beluga whales remain in Cook Inlet year-round, but demonstrate seasonal movement within the Inlet; in the summer and fall, they concentrate in upper Cook Inlet's rivers and bays, but tend to disperse offshore and move to mid-Inlet in winter (Hobbs et al., 2005). The available information indicates that in the winter months belugas concentrate in deeper waters in mid-Inlet past Kalgin Island, with occasional forays into the upper inlet, including the upper ends of Knik and Turnagain Arms. Their winter distribution does not appear to be associated with river mouths, as it is during the warmer months. The spatial dispersal and diversity of winter prey are likely to influence the wider beluga winter range throughout the mid-Inlet. Apache now expects to commence its seismic survey in April, which would coincide with the time of year when belugas are dispersed offshore in the mid-Inlet and away from river mouths. In the spring, beluga whales are regularly sighted in the upper Inlet beginning in late April or early May, coinciding with eulachon runs in the Susitna River and Twenty Mile River in Turnagain Arm, and well outside of the area where Apache will be conducting seismic surveys. Therefore, NMFS believes that the timing and location of the seismic survey, as proposed, will avoid areas and seasons that overlap with important beluga whale behavioral patterns.

Comment 14: Environmental NGOs commented that NMFS must resubmit the proposed

IHA for notice and comment when the results from the sound source verification study assessing underwater noise produced on explosive detonations onshore become available.

Response: In the Federal Register notice announcing the proposed IHA, NMFS indicated that Apache would be conducting a sound source verification (SSV) study to measure in-water noise from the detonation of explosives onshore (76 FR 58473, September 21, 2011). The results from this study are summarized below and the complete report is posted on the internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm>. On September 17-18, 2011, two acoustic teams conducted the SSV test to ensure that marine mammals would not be exposed to underwater received levels exceeding NMFS' threshold for Level B harassment during the proposed seismic survey. The SSV test consisted of a total of seven shot locations beginning in the mudflats, three locations in the lowlands and spaced every half mile for 4 miles inland, for a total of 24 holes. Each location had a 1 kg charge buried at 25 ft, a 2 kg charge buried at 25 ft, and a 4 kg charge buried at 35 ft. To monitor the explosions onshore, three JASCO Ocean Bottom Hydrophones (OBHs) were deployed at 3 km, 6 km, and 10 km from the last shothole on the testline two JASCO vessel-based real-time acoustic monitoring and data logging stations were deployed from vessels located at 3 km and 6 km from the last shothole on the testline, and one 4-channel particle velocity and acceleration measurement system was deployed from a vessel approximately 1 km from the last shothole on the testline. The results were analyzed from the three loudest shots recorded on the OBH and vessel-based data logging systems located 3 km from the shot nearest the vessels. The OBH was at a depth of approximately 30 m, 1.5 m above the seafloor, and the over-the-side system was at a depth of 2 m. In general, the sound levels measured by the over-the-side hydrophone were lower than those measured by the OBH; however, this was expected because low-frequency sounds are strongly attenuated near the sea

surface due to the proximity of the pressure-release boundary. The OBH at 3 km recorded received levels between 142-144 dB re 1 μ Pa (0-Peak SPL) and between 130-132 dB re 1 μ Pa²/s SEL. The over-the-side system at 3 km recorded received levels of between 117-124 dB re 1 μ Pa (0-Peak SPL) and between 106-114 dB re 1 μ Pa²/s SEL. These results are well below the NMFS criterion of 160 dB and do not constitute an activity that would result in the incidental take of marine mammals or require inclusion in Apache's IHA request.

Description of Marine Mammals in the Area of the Specified Activity

The marine mammal species under NMFS's jurisdiction that could occur near operations in Cook Inlet include three cetacean species: beluga whale (*Delphinapterus leucas*), killer whale (*Orcinus orca*), and harbor porpoise (*Phocoena phocoena*), and two pinniped species: harbor seal (*Phoca vitulina richardsi*) and Steller sea lions (*Eumetopias jubatus*). The marine mammal species that is likely to be encountered most widely (in space and time) throughout the period of the planned survey is the harbor seal.

Of the five marine mammal species likely to occur in the proposed marine survey area, only Cook Inlet beluga whales and Steller sea lions are listed as endangered under the ESA (Steller sea lions are listed as two distinct population segments (DPSs), an eastern and a western DPS; the relevant DPS in Cook Inlet is the western DPS). These species are also designated as "depleted" under the MMPA. Despite these designations, Cook Inlet beluga whales and the western DPS of Steller sea lions have not made significant progress towards recovery. The Cook Inlet population of beluga whales has been decreasing at a rate of 1.5 percent annually for nearly a decade (Allen and Angliss, 2010). With respect to Steller sea lions, results of aerial surveys conducted in 2008 (Fritz et al., 2008) confirmed that the recent (2004-2008) overall trend in the western population of adult and juvenile Steller sea lions in Alaska is stable or possibly in

decline; however, there continues to be considerable regional variability in recent trends. Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga whales and Steller sea lions. The proposed action falls within critical habitat designated in Cook Inlet for beluga whales, but is not within critical habitat designated for Steller sea lions. The portion of beluga whale critical habitat – identified as Area 2 - where the seismic survey will occur is located south of the Area 1 critical habitat where belugas are particularly vulnerable to impacts due to their high seasonal densities and the biological importance of the area for foraging, nursery, and predator avoidance. Area 2 is largely based on dispersed fall and winter feeding and transit areas in waters where whales typically appear in smaller densities or deeper waters (76 FR 20180, April 11, 2011).

Cetaceans

Beluga Whales—Cook Inlet beluga whales reside in Cook Inlet year-round although their distribution and density change seasonally. Factors that are likely to influence beluga whale distribution within the inlet include prey availability, predation pressure, sea-ice cover, and other environmental factors, reproduction, sex and age class, and human activities (Rugh et al., 2000; NMFS, 2008). Seasonal movement and density patterns as well as site fidelity appear to be closely linked to prey availability, coinciding with seasonal salmon and eulachon concentrations (Moore et al., 2000). For example, during spring and summer, beluga whales are generally concentrated near the warmer waters of river mouths where prey availability is high and predator occurrence is low (Huntington 2000; Moore et al., 2000). Beluga whales use several areas of the upper Cook Inlet for repeated summer and fall feeding. The primary hotspots for beluga feeding include the Big and Little Susitna rivers, Eagle Bay to Eklutna River, Ivan Slough, Theodore River, Lewis River, and Chickaloon River and Bay (NMFS, 2008). Availability of prey species

appears to be the most influential environmental variable affecting Cook Inlet beluga whale distribution and relative abundance (Moore et al., 2000). The patterns and timing of eulachon and salmon runs have a strong influence on beluga whale feeding behavior and their seasonal movements (Nemeth et al., 2007; NMFS 2008). The presence of prey species may account for the seasonal changes in beluga group size and composition (Moore et al., 2000).

Aerial and vessel-based monitoring conducted by Apache during the March 2011 2D test program in Cook Inlet reported 33 beluga sightings. One of the sightings was of a large group (~25 individuals on March 27, 2011) of feeding/milling belugas near the mouth of the Drift River. Also on March 27, 2011, PSOs onboard the M/V Dreamcatcher reported a group of seven beluga whales approximately 0.5 nm from the vessel. Land-based PSOs were able to observe this group of beluga whales for approximately 2.5 hrs. A single beluga whale was observed near the mouth of the Drift River by the aerial-based monitors on March 28, 2011, prior to the seismic ramp-up period. If belugas are present during the late summer/early fall, they are more likely to occur in shallow areas near river mouths in upper Cook Inlet. As explained below in the section on Estimated Takes, expected densities were calculated from the annual aerial surveys conducted by NMFS between 2000 and 2010 (Rugh et al., 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007; Shelden et al., 2008, 2009, 2010). In response to the Commission's recommendation (see Comment #2), Apache recalculated beluga whale densities for non-river mouths. Those updated densities are presented in Table 3.

Killer Whales—In general, killer whales are rare in upper Cook Inlet, where transient killer whales are known to feed on beluga whales and resident killer whales are known to feed on anadromous fish (Shelden et al., 2003). The availability of these prey species largely determines the likeliest times for killer whales to be in the area. Between 1993 and 2004, 23 sightings of

killer whales were reported in the lower Cook Inlet during aerial surveys by Rugh et al. (2005). Surveys conducted over a span of 20 years by Shelden et al. (2003) reported 11 sightings in upper Cook Inlet between Turnagain Arm, Susitna Flats, and Knik Arm. No killer whales were spotted during recent surveys by Funk et al. (2005), Ireland et al. (2005), Brueggeman et al. (2007a, 2007b, 2008), or Prevel Ramos et al. (2006, 2008). Eleven killer whale strandings have been reported in Turnagain Arm, six in May 1991 and five in August 1993. Therefore, few killer whales, if any, are expected to approach or be in the vicinity of the action area.

Harbor Porpoise—The most recent estimated maximum density for harbor porpoises in Cook Inlet is 7.2 per 1,000 km² (Dahlheim et al., 2000) indicating that only a small number use Cook Inlet. Harbor porpoise have been reported in lower Cook Inlet from Cape Douglas to the West Foreland, Kachemak Bay, and offshore (Rugh et al., 2005). Small numbers of harbor porpoises have been consistently reported in upper Cook Inlet between April and October, except for a recent survey that recorded higher than usual numbers. Prevel Ramos et al. (2008) reported 17 harbor porpoises from spring to fall 2006, while other studies reported 14 in the spring of 2007 (Brueggeman et al., 2007) and 12 in the fall (Brueggeman et al., 2008). During the spring and fall of 2007, 129 harbor porpoises were reported between Granite Point and the Susitna River; however, the reason for the higher numbers of harbor porpoise in the upper Cook Inlet remains unclear and the disparity with the results of past sightings suggests that it may be an anomaly. The spike in reported sightings occurred in July, which was followed by sightings of 79 harbor porpoises in August, 78 in September, and 59 in October, 2007. It is important to note that the number of porpoises counted more than once was unknown, which suggests that the actual numbers are likely smaller than those reported. On the other hand, recent passive acoustic research in Cook Inlet by the Alaska Department of Fish and Game and the National Marine

Mammal Laboratory have indicated that harbor porpoises occur in the area more frequently than previously thought, particularly in the West Foreland area in the spring (NMFS 2011); however overall numbers are still unknown at this time.

Pinnipeds

Harbor Seals—Harbor seals inhabit the coastal and estuarine waters of Cook Inlet. In general, harbor seals are more abundant in lower Cook Inlet than in upper Cook Inlet, but they do occur in the upper inlet throughout most of the year (Rugh et al., 2005). Harbor seals are non-migratory; their movements are associated with tides, weather, season, food availability, and reproduction. The major haulout sites for harbor seals are located in lower Cook Inlet and their presence in the upper inlet coincides with seasonal runs of prey species. For example, harbor seals are commonly observed along the Susitna River and other tributaries along upper Cook Inlet during the eulachon and salmon migrations (NMFS, 2003). During aerial surveys of upper Cook Inlet in 2001, 2002, and 2003, harbor seals were observed 24 to 96 km south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga Rivers (Rugh et al., 2005). During the 2D test program in March 2011, two harbor seals were observed by vessel-based PSOs. On March 25, 2011, one harbor seal was observed approximately 400 m from the M/V Miss Diane. At the time of the observation, the vessel was operating the positioning pinger and PSOs instructed the operator to implement a shut-down. The pinger was shut down for 30 minutes while PSO monitored the area and re-started the device when the animal was not sighted again during the 30 minute site clearing protocol. No unusual behaviors were reported during the time the animal was observed. The second harbor seal was observed on March 26, 2011, by vessel-based PSO onboard the M/V Dreamcatcher approximately 4260 m from the source vessel, which was operating the 10 in³ airgun at the time. The animal was well

outside of the 160 dB zone (330 m for the 10 in³ airgun) and no unusual behaviors were observed. The closest haulout site to the action area is located on Kalgin Island, which is approximately 22 km away from the McArthur River.

Steller Sea Lion—Two separate stocks of Steller sea lions are recognized within U.S. waters: an eastern DPS, which includes animals east of Cape Suckling, Alaska; and a western DPS, which includes animals west of Cape Suckling (NMFS, 2008). Individuals in Cook Inlet are considered part of the western DPS, which is listed as an endangered under the ESA. Steller sea lions primarily occur in lower, rather than upper Cook Inlet and are rarely sighted north of Nikiski on the Kenai Peninsula. Haul-outs and rookeries are located near Cook Inlet at Gore Point, Elizabeth Island, Perl Island, and Chugach Island (NMFS, 2008). No Steller seal lion haul-outs or rookeries are located in the vicinity of the proposed seismic survey. Furthermore, no sightings of Steller sea lions were reported by Apache during the 2D test program in March 2011. Although Apache has requested takes of Steller sea lions, it is unlikely that any Steller sea lions would occur in the action area during seismic survey operations.

Apache's application contains additional information on the status, distribution, seasonal distribution, and abundance of each of the affected species under NMFS' jurisdiction mentioned in this document. Please refer to the application for that information (see ADDRESSES).

Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2010 SAR is available at: <http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf>.

Potential Effects of the Airgun Sounds on Marine Mammals

The effects of sounds from airgun pulses might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent hearing impairment, or non-auditory physical or physiological effects (Richardson et al., 1995; Gordon et

al., 2004; Nowacek et al., 2007; Southall et al., 2007). As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable. The Notice of Proposed IHA (76 FR 58473, September 21, 2011) included a discussion of the effects of airguns on marine mammals, which is not repeated here. That discussion took into consideration the monitoring and mitigation measure proposed by Apache and NMFS. No cases of temporary threshold shift (TTS) are expected as a result of Apache's activities given the small size of the source, the strong likelihood that marine mammals would avoid the approaching airguns (or vessels) before being exposed to levels high enough for there to be any possibility of TTS, and the mitigation measures required to be implemented during the survey described later in this document. Based on the fact that the sounds produced by Apache's operations are unlikely to cause TTS in marine mammals, it is extremely unlikely that permanent hearing impairment would result. No injuries or mortalities are anticipated as a result of Apache's operations, and none are authorized to occur. Only Level B harassment is anticipated as a result of Apache's activities.

Potential Effects from Pingers on Marine Mammals

Active acoustic sources other than the airguns have been proposed for Apache's 2012 seismic survey in Cook Inlet. The specifications for the pingers (source levels and frequency ranges) were provided in the Notice of Proposed IHA (76 FR 58473, September 21, 2011). In general, the potential effects of this equipment on marine mammals are similar to those from the airguns, except the magnitude of the impacts is expected to be much less due to the lower intensity of the source.

Potential Effects from Vessels and Vessel Noise on Marine Mammals

Vessel activity and noise associated with vessel activity will temporarily increase in the

action area during Apache's seismic survey as a result of the operation of eight vessels. To minimize the effects of vessels and noise associated with vessel activity, Apache will follow NMFS' Marine Mammal Viewing Guidelines and Regulations and will alter heading or speed if a marine mammal gets too close to a vessel. In addition, vessels will be operating at slow speed (2-4 knots) when conducting surveys and in a purposeful manner to and from work sites in as direct a route as possible. Marine mammal monitoring observers and passive acoustic devices will alert vessel captains as animals are detected to ensure safe and effective measures are applied to avoid coming into direct contact with marine mammals. Therefore, NMFS neither anticipates nor authorizes takes of marine mammals from ship strikes.

Odontocetes, such as beluga whales, killer whales, and harbor porpoises, often show tolerance to vessel activity; however, they may react at long distances if they are confined by ice, shallow water, or were previously harassed by vessels (Richardson, 1995). Beluga whale response to vessel noise varies greatly from tolerance to extreme sensitivity depending on the activity of the whale and previous experience with vessels (Richardson, 1995). Reactions to vessels depends on whale activities and experience, habitat, boat type, and boat behavior (Richardson, 1995) and may include behavioral responses, such as altered headings or avoidance (Blane and Jaakson, 1994; Erbe and Farmer, 2000); fast swimming; changes in vocalizations (Lesage et al., 1999; Scheifele et al., 2005); and changes in dive, surfacing, and respiration patterns.

There are few data published on pinniped responses to vessel activity, and most of the information is anecdotal (Richardson, 1995). Generally, sea lions in water show tolerance to close and frequently approaching vessels and sometimes show interest in fishing vessels. They are less tolerant when hauled out on land; however, they rarely react unless the vessel approaches

within 100-200 m (330-660 ft; reviewed in Richardson, 1995).

The addition of eight vessels and noise due to vessel operations associated with the seismic survey would not be outside the present experience of marine mammals in Cook Inlet, although levels may increase locally. Given the large number of vessels in Cook Inlet and the apparent habituation to vessels by Cook Inlet beluga whales and the other marine mammals that may occur in the area, vessel activity and noise is not expected to have effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Potential Effects from Aircraft Noise on Marine Mammals

Apache plans to utilize the crew helicopter to conduct aerial surveys near river mouths in order to identify locations or congregations of beluga whales and other marine mammals prior to the commencement of operations. The helicopter will not be used every day, but will be used for surveys near river mouths. Aerial surveys will fly at an altitude of 305 m (1,000 ft) when practicable and weather conditions permit. In the event of a marine mammal sighting, aircraft will try to maintain a radial distance of 457 m (1,500 ft) from the marine mammal(s). Aircraft will avoid approaching marine mammals from head-on, flying over or passing the shadow of the aircraft over the marine mammals.

Studies on the reactions of cetaceans to aircraft show little negative response (Richardson et al., 1995). In general, reactions range from sudden dives and turns and are typically found to decrease if the animals are engaged in feeding or social behavior. Whales with calves or in confined waters may show more of a response. Generally there has been little or no evidence of marine mammals responding to aircraft overflights when altitudes are at or above 1,000 ft, based on three decades of flying experience in the Arctic (NMFS, unpublished data). Based on long-term studies that have been conducted on beluga whales in Cook Inlet since 1993, NMFS expect

that there will be no effects of this activity on beluga whales or other cetaceans. No change in beluga swim directions or other noticeable reactions have been observed during the Cook Inlet aerial surveys flown from 600 to 800 ft. (e.g., Rugh et al., 2000). By applying the operational requirements discussed above, sound levels underwater are not expected to reach NMFS' harassment thresholds.

The majority of observations of pinnipeds reacting to aircraft noise are associated with animals hauled out on land or ice. There are very little data describing the reactions of pinnipeds in water to aircraft (Richardson et al., 1995). In the presence of aircraft, pinnipeds hauled out for pupping or molting generally became alert and then rushed or slipped (when on ice) into the water. Stampedes often result from this response and may increase pup mortality due to crushing or an increase rate of pup abandonment. The greatest reactions from hauled out pinnipeds were observed when low flying aircrafts passed directly above the animal(s) (Richardson et al., 1995). Although noise associated with aircraft activity could cause hauled out pinnipeds to rush into the water, there are no known haul out sites in the vicinity of the survey site.

Therefore, the operation of aircraft during the seismic survey is not expected to have effects that could cause significant or long-term consequences for individual marine mammals or their populations. To minimize the noise generated by aircraft, Apache will follow NMFS' Marine Mammal Viewing Guidelines and Regulations found at <http://www.alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm>.

Anticipated Effects on Marine Mammal Habitat

NMFS included a detailed discussion of the potential effects of this action on marine mammal habitat, including physiological and behavioral effects on marine fish and invertebrates, in the notice of the proposed IHA (76 FR 58473, September 21, 2011). While NMFS anticipates

that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat is temporary and site-specific, which NMFS considered as behavioral modification. The main impact associated with the activity would be temporarily elevated noise levels and the associated direct effects on marine mammals.

Mitigation

In order to issue an incidental take authorization under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

To reduce the potential for disturbance from acoustic stimuli associated with the activities, Apache and/or its designees will implement the following mitigation measures for marine mammals:

(1) Operation of Mitigation Airgun at Night

Apache proposes to conduct both daytime and nighttime operations. Nighttime operations will only be initiated if a mitigation airgun (typically the 10 in³) has been continuously operational from the time that PSO monitoring has ceased for the day. The mitigation airgun will operate on a longer duty cycle than the full airgun arrays, firing every 30-45 seconds. Seismic activity will not ramp up from an extended shut-down (i.e., when the airgun has been down with no activity for at least 10 minutes) during nighttime operations and survey activities will be suspended until the following day because dedicated PSOs will not be on duty and any unseen animals may be exposed to injurious levels of sound from the full array. At

night, the vessel captain and crew will maintain lookout for marine mammals and will order the airgun(s) to be shut down if marine mammals are observed in or about to enter the established safety radii.

(2) Safety and Disturbance Zones

NMFS mitigation or shutdown “safety radii” for limiting marine mammal exposure to impulse sources typically correspond to the distances within which received sound levels are ≥ 180 dB_{rms} re 1 μ Pa for cetaceans and ≥ 190 dB_{rms} re 1 μ Pa for pinnipeds. These safety criteria are based on an assumption that SPLs received at levels lower than these will not injure these animals or impair their hearing abilities. Disturbance or behavioral effects to marine mammals from underwater sound may occur from exposure to sound at lower SPLs, at distances greater than the safety radii (Richardson et al., 1995). The disturbance zone is defined as the area between the 180/190 dB threshold and the 160 dB threshold where NMFS has determined that harassment in the form of behavioral disturbance may occur.

The proposed survey will use airgun sources composed of two 2400 in³ airguns, a single 440 in³ airgun, and a single 10 in³ airgun. Safety and disturbance radii for the sound levels produced by the planned airgun configurations and pinger have been estimated (see Table 1) and will be used for mitigation purposes during the seismic survey activities.

Table 1: Estimated Distances to Sound Thresholds (Apache will conduct a sound source verification study to determine the actual distances to these threshold zones)

Source	190 dB	180 dB	160 dB
Pinger	1 m	3 m	25 m
10 cui Airgun	10 m	33 m	330 m
440 cui Airgun	NA	NA	NA
2,400 cui airgun (nearshore)	0.51 km	1.42 km	6.41 km
2,400 cui airgun (offshore)	1.18 km	0.98 km	4.89 km

In addition to the marine mammal monitoring radii described above, pursuant to Alaska Department of Fish and Game restrictions, there will be a 1.6 km setback of sound source points from the mouths of any anadromous streams.

Apache also plans to use dedicated vessels to deploy and retrieve the nodal recording system. Sounds produced by the vessels are not expected to exceed 180 dB (rms). Therefore, mitigation related to acoustic impacts from these activities is not expected to be necessary.

(3) Power-downs

A power-down for mitigation purposes is the immediate reduction in the number of operating airguns such that the radii of the 190 dB rms and 180 dB rms zones are decreased to the extent that observed marine mammal(s) are not in the applicable safety zone of the full array. During a power-down, one airgun, typically the 10 in³, continues firing. Operation of the 10 in³ airgun decreases the safety radii to 10 m, 33 m, and 330 m for the 190 dB, 180 dB, and 160 dB zones, respectively. The continued operation of one airgun is intended to (a) alert marine mammals to the presence of the survey vessel in the area, and (b) retain the option of initiating a ramp up to full operations under poor visibility conditions (including nighttime).

The array will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable safety zone of the full array, but is outside the applicable safety zone of the single mitigation airgun. Likewise, if a mammal is already within the safety zone when first detected, the airguns will be powered down immediately. If a marine mammal is sighted within or about to enter the applicable safety zone of the single mitigation airgun, it too will be shut down (see following section).

Following a power-down, operation of the full airgun array will not resume until the marine mammal has cleared the safety zone applicable to the full array. The animal will be considered to have cleared the safety zone if it

- is visually observed to have left the safety zone of the full array, or
- has not been seen within the zone for 15 min in the case of pinnipeds or small odontocetes (e.g., Steller sea lion, harbor seals, or harbor porpoises), or
- has not been seen within the zone for 30 min in the case of large odontocetes (e.g., killer whales or beluga whales).

(4) Shut-downs

The operating airgun(s) will be shut down completely if a marine mammal approaches or enters the safety radius and a power-down is not practical or adequate to reduce exposure to less than 190 or 180 dB rms, as appropriate. In most cases, this means the mitigation airgun will be shut down completely if a marine mammal approaches or enters the estimated safety radius for the single 10 in³ airgun while it is operating during a power down. Airgun activity will not resume until the marine mammal has cleared the safety radius. The animal will be considered to have cleared the safety radius as described above under power down procedures.

(5) Ramp Ups

A ramp up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume is achieved. The purpose of a ramp-up (or “soft start”) is to “warn” undetected cetaceans and pinnipeds in the vicinity of the airguns and to provide the time for them to move far enough away from the airguns to avoid any potential injury or impairment of their hearing abilities.

During the proposed seismic survey, the seismic operator will ramp up the airgun array slowly. NMFS requires the rate of ramp-up to be no more than 6 dB per 5-minute period. Ramp-up is used at the start of airgun operations, after a power- or shut-down, and after any period of greater than 10 minutes in duration without airgun operations (i.e., extended shutdown).

A full ramp up after a shut down will not begin until there has been a minimum of 30 minutes of observation of the safety zone by PSOs to assure that no marine mammals are present. The entire safety zone must be visible during the 30-minute lead-in to a full ramp up. If the entire safety zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the safety zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the safety zone or the animal(s) is not sighted for at least 15-30 minutes: 15 minutes for small odontocetes and pinnipeds (e.g. harbor porpoises, harbor seals, and Steller sea lions), or 30 minutes for large odontocetes (e.g., killer whales and beluga whales).

(6) Speed and Course Alterations

If a marine mammal is detected outside the applicable safety radius and, based on its position and the relative motion, is likely to enter the safety radius, changes of the vessel's speed and/or direct course will be considered if this does not compromise operational safety. For marine seismic surveys using large arrays, course alterations are not typically possible. However, for the smaller airgun arrays planned during the proposed site surveys, such changes may be possible. After any such speed and/or course alteration is begun, the marine mammal activities and movements relative to the survey vessel will be closely monitored to ensure that the marine mammal does not approach within the relevant safety radius. If the mammal appears

likely to enter the safety radius, further mitigative actions will be taken, including a power down or shut down of the airgun(s).

Additional Mitigation Measures Proposed by NMFS

Besides Apache's proposed mitigation measures discussed above, NMFS is requiring the following additional protective measures for beluga whale cow-calf pairs and aggregations of whales. This measure is designed to avoid exposing young animals to sounds levels which they may have never previously experienced and prevent the potential separation of mothers from their calves. In addition, because species like killer and beluga whales often travel in groups, the added protective measures for aggregations will avoid exposing groups of whales, which often contain calves, to harassment sounds levels produced during seismic surveys. Specifically, a 160-dB disturbance monitoring zone will be established and monitored in Cook Inlet during all seismic surveys. Whenever an aggregation of beluga whales or killer whales (five or more whales of any age/sex class) or a beluga cow-calf pair are observed approaching or within the 160-dB disturbance zone around the survey operations, the survey activity will not commence or will shut down, until they are no longer present within the 160-dB disturbance zone of seismic surveying operations.

Furthermore, NMFS requires the following measures in the IHA:

- (1) All vessels will reduce speed when within 300 yards (274 m) of any whale, and those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales from other members of the group;
- (2) Avoid multiple changes in direction and speed when within 300 yards (274 m) of whales; and
- (3) When weather conditions require, such as when visibility drops, support vessels must

adjust speed (increase or decrease) and direction accordingly to avoid the likelihood of injury to whales.

Mitigation Conclusions

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- the practicability of the measure for applicant implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has determined that the mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that

will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring Measures

Apache will provide marine mammal monitoring to implement the mitigation measures that require real-time monitoring.

(1) Visual Vessel-based Monitoring

Vessel-based monitoring for marine mammals will be done by experienced PSOs throughout the period of marine survey activities. PSOs will monitor the occurrence and behavior of marine mammals near the survey vessel during all daylight periods before, during, and after survey operations and during most daylight periods when airgun operations are not occurring. PSO duties will include watching for and identifying marine mammals, recording their numbers, distances, and reactions to the survey operations, and documenting takes incidental to the specified activity.

A sufficient number of PSOs will be required onboard the survey vessels to meet the following criteria: (1) 100 percent monitoring coverage during all periods of survey operations in daylight; (2) maximum of 4 consecutive hours on watch per PSO; and (3) maximum of 12 hours of watch time per day per PSO.

PSO teams will consist of experienced field biologists. An experienced field crew leader will supervise the PSO team onboard the survey vessel. Apache currently plans to have PSOs aboard the three vessels: the two source vessels (M/V Peregrine Falcon and M/V Arctic Wolf) and one support vessel (M/V Dreamcatcher). Two PSOs will be on the source vessels and two PSOs will be on the support vessel to observe the safety and disturbance zones. When marine mammals are about to enter or are sighted within designated safety zones, airgun or pinger

operations will be powered down (when applicable) or shut down immediately. The vessel-based observers will watch for marine mammals during all periods when sound sources are in operation and for a minimum of 30 minutes prior to the start of airgun or pinger operations after an extended shut down.

Crew leaders and most other biologists serving as observers will be individuals with experience as observers during seismic surveys in Alaska or other areas in recent years.

The observer(s) will watch for marine mammals from the best available vantage point on the source and support vessels, typically the flying bridge. The observer(s) will scan systematically with the unaided eye and 7×50 reticle binoculars. Laser range finders will be available to assist with estimating distance. Personnel on the bridge will assist the observer(s) in watching for marine mammals.

All observations will be recorded in a standardized format. Data will be entered into a custom database using a notebook computer. The accuracy of the data will be verified by computerized validity data checks as the data are entered and by subsequent manual checks of the database. These procedures will allow for initial summaries of the data to be prepared during and shortly after the completion of the field program, and will facilitate transfer of the data to statistical, geographical, or other programs for future processing and archiving. When a mammal sighting is made, the following information about the sighting will be recorded:

(A) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the PSO, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace;

(B) Time, location, speed, activity of the vessel, sea state, ice cover, visibility, and sun

glare; and

(C) The positions of other vessel(s) in the vicinity of the PSO location.

The ship's position, speed of support vessels, and water temperature, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

(2) Visual Shore-based Monitoring

In addition to the vessel-based PSOs, Apache will utilize a shore-based station to visually monitor for marine mammals. The shore-based station will follow all safety procedures, including bear safety. The location of the shore-based station will need to be sufficiently high to observe marine mammals; the PSOs would be equipped with pedestal mounted "big eye" (20x110) binoculars. The shore-based PSOs would scan the area prior to, during, and after the airgun operations, and would be in contact with the vessel-based PSOs via radio to communicate sightings of marine mammals approaching or within the project area.

(3) Aerial-based Monitoring

When survey operations occur near a river mouth, Apache will utilize the crew helicopter to conduct aerial surveys near river mouths prior to the commencement of airgun operations in order to identify locations where beluga whales congregate. The helicopter may also be used at other times. The types of helicopters currently planned for use by Apache include a Bell 407, Bell UH1B, and ASB3. Weather and scheduling permitting, aerial surveys will fly at an altitude of 305 m (1,000 ft). In the event of a marine mammal sighting, aircraft will attempt to maintain a radial distance of 457 m (1,500 ft) from the marine mammal(s). Aircraft will avoid approaching marine mammals from head-on, flying over or passing the shadow of the aircraft

over the marine mammal(s). By following these operational requirements, sound levels received underwater are not expected to meet or exceed NMFS harassment thresholds (Richardson et al., 1995; Blackwell et al., 2002).

(4) Acoustic Monitoring

To further enhance detection of cetaceans, Apache will deploy passive acoustic monitoring (PAM) devices during the seismic survey. Apache anticipates utilizing the same system that was deployed during the 2D test program in March 2011 in Cook Inlet that was effective in detecting vocalizing belugas and harbor porpoises. Apache expects to deploy two PAM devices that will send real-time acoustic data via digital UHF radio-broadcast systems to the PAM operators aboard the M/V Dreamcatcher. The PAM operators will use specialized real-time detection software and audio playback to detect marine mammal sounds. If the PAM operators detect marine mammals, Apache will initiate a temporary shut-down of the airgun arrays to avoid takes. Following a shut-down, the airguns may be restarted in accordance with the ramp-up procedure described earlier.

Reporting Measures

(1) SSV Report

A report on the preliminary results of the acoustic verification measurements, including at a minimum the measured 190-, 180-, and 160-dB_{rms} re 1 μ Pa radii of the airgun arrays and pinger, will be submitted within 120 hr after collection and analysis of those measurements at the start of the field season. This report will specify the distances of the exclusion zones that were adopted for the seismic survey activities.

(2) Field Reports

During the proposed survey program, the PSOs will prepare a report each day

summarizing the recent results of the monitoring program. The field reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to NMFS and to the survey operators on a weekly basis.

(3) Technical Report

The results of Apache's 2012 monitoring program, including estimates of "take" by harassment (based on presence in the 160 dB harassment zone), will be presented in a "90-day" and a Final Technical report. The Technical Report will include:

- (a) summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
- (b) analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
- (c) species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;
- (d) analyses of the effects of survey operations;
 - sighting rates of marine mammals during periods with and without seismic survey activities (and other variables that could affect detectability), such as:
 - initial sighting distances versus survey activity state;
 - closest point of approach versus survey activity state;
 - observed behaviors and types of movements versus survey activity state;
 - numbers of sightings/individuals seen versus survey activity state;
 - distribution around the source vessels versus survey activity state; and

- estimates of take by Level B harassment based on presence in the 160 dB disturbance zone.

(4) Comprehensive Report

Following the survey season, a comprehensive report describing the vessel-based, shore-based, aerial-based, and acoustic monitoring programs will be prepared. The comprehensive report will describe the methods, results, conclusions and limitations of each of the individual data sets in detail. The report will also integrate (to the extent possible) the studies into a broad based assessment of industry activities, and other activities that occur in Cook Inlet, and their impacts on marine mammals. The report will help to establish long-term data sets that can assist with the evaluation of changes in the Cook Inlet ecosystem. The report will attempt to provide a regional synthesis of available data on industry activity in this part of Alaska that may influence marine mammal density, distribution and behavior.

(5) Notification of Injured or Dead Marine Mammals

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury, serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), Apache will immediately cease the specified activities and immediately report the incident to the Chief of the Permits, Conservation, and Education Division, Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinators. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;

- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities will not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with Apache to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Apache may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that Apache discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), Apache will immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with Apache to determine whether modifications in the activities are appropriate.

In the event that Apache discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in

the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Apache will report the incident to the Chief of the Permits, Conservation, and Education Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators, within 24 hours of the discovery. Apache will provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

Estimated Take of Marine Mammals

Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]. Only take by Level B behavioral harassment is anticipated as a result of the proposed marine survey program. Anticipated impacts to marine mammals are associated with noise propagation from the sound sources (e.g., airguns and pingers) used in the seismic survey; no take is expected to result from the detonation of explosives onshore, as supported by the SSV study, or from vessel strikes.

Apache requests authorization to take five marine mammal species by Level B harassment. These five marine mammal species are: Cook Inlet beluga whale (*Delphinapterus leucas*); killer whale (*Orcinus orca*); harbor porpoise (*Phocoena phocoena*); harbor seal (*Phoca vitulina richardsi*), and Steller sea lion (*Eumetopias jubatus*).

The full suite of potential impacts to marine mammals was described in detail in the

“Potential Effects of the Specified Activity on Marine Mammals” section found earlier in this document and in the notice of proposed IHA. The potential effects of sound from the proposed seismic survey might include one or more of the following: tolerance; masking of natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson et al., 1995). The most common and likely impact will be from behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of the animal. Hearing impairment (TTS and PTS) are highly unlikely to occur based on the required mitigation and monitoring measures that would preclude marine mammals being exposed to noise levels high enough to cause hearing impairment.

For impulse sounds, such as those produced by airgun(s) and pingers used in the seismic survey, NMFS uses a received level of 160 dB_{rms} re 1 µPa to indicate the onset of Level B harassment. However, not all animals react to sounds at this level, and many will not show strong reactions (and in some cases any reaction) until sounds are stronger. Southall et al. (2007) provide a severity scale for ranking observed behavioral responses of both free-ranging marine mammals and laboratory subjects to various types of anthropogenic sound (see Table 4 in Southall et al. (2007)). Tables 7, 9, and 11 in Southall et al. (2007) outline the numbers of low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds in water, respectively, reported as having behavioral responses to multi-pulses in 10-dB received level increments. These tables illustrate that while some studies have found moderate responses at these levels, some show that more severe reactions did not occur until sounds were much higher than 160 dB_{rms} re 1µPa.)

To estimate take by Level B harassment, Apache provided calculations for the size of the 160-dB isopleths and then overlaid those isopleths with the density of marine mammals in the

total area ensonified within those isopleths over the time of the surveys. Apache provided a full description of the methodology used to estimate takes by harassment in its IHA application (see ADDRESSES), which is also provided in the following sections. NMFS used Apache's takes estimates in its analyses.

More specifically, to estimate takes by harassment, ranges to the 160 dB_{rms} re 1 µPa isopleths were estimated at three different water depths (5 m, 25 m, and 45 m) for nearshore surveys and at 80 m for channel surveys. The distances to these isopleths are provided in Table 1. The areas ensonified to the 160 dB isopleth for the nearshore survey are provided in Table 2. The area ensonified to the 160 dB isopleth for the channel survey is 389 km².

Table 2: Areas Ensonified to 160 dB for Nearshore Surveys

Nearshore Survey Depth Classification	Depth Range (m)	Area Ensonified to 160 dB (km ²)
Shallow	5-21	346
Mid-Depth	21-38	458
Deep	38-54	455

The following subsections describe how the estimated densities of marine mammals that may occur in the area were derived. It is important to note that, based on the comment letter received from the Marine Mammal Commission that pointed out errors in the density estimates for belugas, harbor porpoises, harbor seals, and Steller sea lions, the densities found in Table 4 below have changed since the notice of the proposed IHA (76 FR 58473, September 21, 2011). These corrected densities were used to estimate the number of Level B harassment takes incidental to the proposed activity.

Marine mammal densities near the planned activities in Cook Inlet were estimated from the annual aerial surveys conducted by NMFS between 2000 and 2010 for Cook Inlet beluga

whales (Rugh et al., 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007; Sheldon et al., 2008, 2009, 2010). These surveys are flown in June to collect abundance data for beluga whales, but sightings of other marine mammals are also reported, and these data were used for estimating the densities of the other species. Although these data are only collected in one month each year, and therefore do not account for seasonal variations in distribution or habitat use of each species, these surveys provide the best available relatively long-term data set for sighting information in the proposed action area. The general trend in marine mammal sightings is that beluga whales and harbor seals are seen most frequently in upper Cook Inlet, with higher concentrations of beluga whales near river mouths (particularly the Susitna River) and of harbor seals near haul out sites on Kalgin Island. The other marine mammals for which takes were estimated (killer whales, harbor porpoises, and Steller sea lions) are observed infrequently in upper Cook Inlet and more commonly in lower Cook Inlet. In addition, these densities are calculated based on a survey of a relatively large area, which is much larger than the survey site. Therefore, the use of these data to estimate density is considered to result in overestimates with respect to the probability of observing these animals in the action area. The maximum and average densities over the course of the total survey years (2000-2010) are provided in Table 3.

As discussed below, beluga whales are observed in higher concentrations near river mouths, particularly the Susitna River, due to feeding. Therefore, to account for the higher concentrations near river mouths, the highest number of beluga whales observed for each year was used to provide a density for river mouths. To account for the lower concentrations away from river mouths, the average number of beluga whales observed for each year was used to provide a density away from river mouths. A maximum and average density are provided to account for the inherent level of uncertainty in using aerial surveys conducted for a few days

once a year in order to estimate density for the entire year.

Table 3: Summary of Marine Mammal Densities

Species	Density (number/km ²)	
	Maximum	Average
Beluga whale (average number observed)	0.00021	0.00011
Beluga whale (maximum number observed – rivers)	0.00128	0.00051
Harbor seal (total number observed)	0.00644	0.00317
Harbor porpoise (total number observed)	0.00037	0.00006
Killer whale (total number observed)	0.00011	0.00001
Steller sea lion (total number observed)	0.00035	0.00011

Below, we provide estimates of the number of individuals potentially exposed to sound levels ≥ 160 dB_{rms} re 1 μ Pa during seismic survey operations. The estimates were calculated by multiplying the expected densities by the anticipated area ensonified by levels ≥ 160 dB_{rms} re 1 μ Pa by the number of expected days that will be subject to seismic survey activities in the action area. According to section 2 in Apache's IHA application, a survey crew will collect seismic data 10-12 hours per day over approximately 160 days over the course of 8 to 9 months. Apache assumes that over the course of these 160 days, 100 days would be working in the offshore region and 60 days would be working in the shallow, intermediate, and deep nearshore region. Of those 60 days in the nearshore region, 20 days would be spent working in each of the three depths. Because operations would occur over 12 hours per day, but acoustic footprints were calculated based on 24 hours of survey activity (i.e., the distance a vessel would travel in 24 hours was used to calculate the square km ensonified in a day, and then that total was multiplied by the number of days that the survey vessel would be operating), the total number of days for each region was divided by two (or half a day) for purposes of calculating takes. It is important to note that environmental conditions (such as ice, wind, and fog) will play a significant role in the actual number of operating days; therefore, these estimates, which are based on the best case

scenario and optimal environmental conditions, likely overestimate the probability of encountering these marine mammal species in the action area because the actual number of operating are likely to be fewer.

The number of estimated takes by Level B harassment was calculated using the following assumptions:

- The number of nearshore and shallow water survey days is 10 (20 days/12 hours) and daily acoustic footprint is 356 km².
- The number of nearshore and intermediate water depth survey days is 10 (20 days/12 hours) and daily acoustic footprint is 468 km².
- The number of nearshore and deep water depth survey days is 10 (20 days/12 hours) and daily acoustic footprint is 455 km².
- The number of offshore survey days is 50 (100 days/12 hours) and daily acoustic footprint is 389 km².

As noted above, Apache modeled the acoustic footprints of the airgun arrays in order to estimate the 160 dB isopleth. The modeling report is attached to the IHA application as Appendix A and summarized below. The nearshore locations were sub-divided into the following three depth intervals because of the sloping bottom contour along the sides of Cook Inlet: 5-21 m; 21-38 m; and 38-54 m. Due to the relatively constant depth in the Inlet's main channel, the channel scenario used a water depth of 80 m. The nearshore survey depth interval subdivisions are based on the zones that can be surveyed in 24 hour periods based on the anticipated nominal survey length of 16.1 km, and survey line spacing of 503 m. Apache estimates that it can complete 12-14 survey lines per day based on normal survey vessel speed

(approximately 2-4 knots). The depth intervals each correspond with 14 adjacent parallel lines based on the rate of depth increase with distance from shore. The different depth intervals were considered separately because the size of the airgun array sound footprint varies with water depth. The largest possible airgun array configuration of 2400 cui was applied to model the noise footprints used in the take calculations, which means that the 160-dB isopleths are likely overestimates when applied to the small arrays that may be used during the actual survey.

The nearshore modeling scenarios were examined by placing the source at three distances offshore corresponding to the following water depths: 5, 25, and 45 m. For each source position, the model predicted distances to the 160 dB re μ 1 Pa (rms) threshold in multiple directions. These distances were subsequently interpolated to predict threshold distances for survey source positions at all depths between 5 m and 54 m. The deep channel survey scenario, with a constant water depth of 80 m, was modeled to predict the distances in the endfire and broadside directions relative to the array where sound levels attenuated to 160 dB re μ 1 Pa (rms).

The 24-hour composite acoustic footprints were calculated from the footprints of the individual survey lines. Each survey line footprint was estimated using a rectangle that encompassed the 160 dB broadside (in shore and offshore directions) and endfire (along-shore) extents for all airgun pulses on that line. The union of 14 survey line footprints created the 24-hour composite acoustic footprint. The union of the single line footprint is smaller than their sum because of overlap.

Table 4 shows the estimated maximum and average exposures to levels above 160dB by species for the first year of seismic surveys in Cook Inlet based on the assumptions outlined above. However, when the density and distribution data for certain species are considered more carefully, as well as the likely effect of the required mitigation measures, the take estimates may

be further refined as illustrated by the requested and authorized number of takes below.

The use of the NMFS aerial survey data has inherent weaknesses that need to be considered. For example, the estimated number of harbor seal takes by Level B harassment is higher than what is actually anticipated because there are no haul-out sites within the action area. Seals in some numbers are expected to be observed in the Susitna River delta, but not in the large numbers that are observed in lower Cook Inlet. The density estimates used to calculate take are skewed upward by the numbers observed in large haul outs during aerial surveys. Seals in the water usually travel in small groups or as single individuals; therefore, although Table 4 indicates an average of 102 and maximum of 207 seals exposed to sounds likely to result in Level B harassment, it is highly unlikely that those number of seals will actually be taken during the proposed seismic survey. To account for the likely overestimate of takes by Level B harassment due to the location of the seismic survey and lack of haul-out sites in the vicinity, Apache requested and NMFS authorizes 50 takes instead.

Similarly, NMFS expects the number of actual Steller sea lion takes by Level B harassment to be lower than the average of four and maximum of 11 indicated in Table 4. During the NMFS aerial surveys, no Steller sea lions were observed in upper Cook Inlet. Less than five Steller sea lions have been observed by the Port of Anchorage monitoring program, and those observed have been juvenile animals (likely male). Apache estimated that there could be 11 Steller sea lions takes by Level B harassment in the proposed action area during the one-year effective period of the IHA; nevertheless, to account for variability and anomalous years where higher than average numbers of Steller sea lions are reported in Cook Inlet, Apache requests and NMFS authorizes 20 takes by Level B harassment.

The average and maximum take estimates for harbor porpoise and killer whales shown in

Table 4. Although the actual number of animals expected to be encountered during seismic survey activities is lower, Apache requests and NMFS authorizes 20 takes of harbor porpoises and 10 takes of killer whales – both by Level B harassment only – to account for annual variability in abundance and distribution in Cook Inlet.

The average and maximum estimated number of takes by Level B harassment for Cook Inlet beluga whales away from river mouths is two and five, respectively. Given that beluga are usually transiting from one feeding area to another in lower concentrations, these estimates appear to be reasonable in assessing the probability for potentially observing beluga whales in the action area. However, it is important to note that a combination of visual and acoustic monitoring will be used extensively throughout this project, particularly for detecting beluga whales approaching the area, and to trigger shutdowns and powerdowns of sound sources, which also has the potential to reduce the actual number of takes.

The average and maximum estimated number of takes by Level B harassment for Cook Inlet beluga whales near river mouths is 16 and 41 animals, respectively. The total number of days actually surveying near river mouths (60 days in the shallow, intermediate, and deep nearshore region) is much lower than the 160 days used to estimate takes in the different water depths, and again, the estimate does not take into account mitigation; therefore, this take estimate is likely to be an overestimate. As a result, due to the actual number of days and hours Apache is likely to be operating airguns near river mouths and taking into account the monitoring and mitigation measures applicable when operating seismic survey equipment near rivers, Apache expects the actual number of takes by Level B harassment estimated for Cook Inlet beluga whales to be much lower than the numbers provided in Table 4. To account for this, Apache requests and NMFS authorizes 30 takes of Cook Inlet beluga whale by Level B harassment.

Table 4 - Estimated Takes by Level B Harassment per Species (without mitigation)

	shallow		mid-depth		deep		offshore		Total	
Species	max	avg	max	avg	max	avg	max	avg	max	avg
Beluga whales – away from river mouths	0.5	0.3	0.7	0.3	0.7	0.3	2.8	1.5	4.7	2.4
Beluga whales – near river mouths	4.5	1.8	5.8	2.3	5.8	2.3	24.8	9.9	41	16.3
Harbor seals	22.9	11.3	29.5	14.5	29.3	14.4	125.3	61.7	207	101.9
Harbor porpoises	1.3	0.2	1.7	0.3	1.7	0.3	7.2	1.2	11.9	2.0
Killer whales	0.4	0.1	0.5	0.1	0.5	0.1	2.2	0.3	3.6	0.5
Steller sea lions	1.2	0.4	1.6	0.5	1.6	0.5	6.8	2.2	11.3	3.7

Table 5 - Authorized Number of Takes by Level B Harassment

Species	Number of Requested Takes	Population Abundance	Percent of Population
Beluga whales	30	284	10
Harbor seals	50	29,175	0.17
Harbor porpoises	20	31,406	0.06
Killer whales	10	1,123	0.89
Steller sea lions	20	41,197	0.12

Negligible Impact and Small Numbers Analysis and Determination

NMFS has defined “negligible impact” in 50 CFR 216.103 as “...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) the number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur.

Given the required mitigation and related monitoring, no injuries or mortalities are anticipated to occur as a result of Apache’s proposed seismic survey in Cook Inlet, and none are

proposed to be authorized. Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. The small number of takes that are anticipated are expected to be limited to short-term Level B behavioral harassment. Although it is possible that some marine mammals individuals may be exposed to sounds from seismic survey activities more than once, the duration of these multi-exposures is expected to be low since both the animals and the survey vessels will be moving constantly in and out of the survey area and the seismic airguns do not operate continuously all day, but for a few hours at a time totaling about 12 hours a day.

Odontocete (including Cook Inlet beluga whales, killer whales, and harbor porpoises) reactions to seismic energy pulses are usually assumed to be limited to shorter distances from the airgun(s) than are those of mysticetes, in part because odontocete low-frequency hearing is assumed to be less sensitive than that of mysticetes. However, at least when in the Canadian Beaufort Sea in summer, belugas appear to be fairly responsive to seismic energy, with few being sighted within 6–12 mi (10–20 km) of seismic vessels during aerial surveys (Miller et al. 2005). Due to the more dispersed distribution of beluga whales when Apache plans to commence its seismic surveys and the concentration of animals in the upper Inlet during spring and summer in response to the presence of prey species such as eulachon and salmon, belugas will likely occur in small numbers in Cook Inlet during the survey period and few will likely be affected by the survey activity in a manner that would be considered behavioral harassment. For the same reason, it is unlikely that any individual animal would be exposed to higher received levels multiple times.

Taking into account the mitigation measures that are planned, effects on cetaceans are generally expected to be restricted to avoidance of a limited area around the survey operation and

short-term changes in behavior, falling within the MMPA definition of “Level B harassment”. Animals are not expected to permanently abandon the area, and any behaviors that are interrupted during the survey are expected to resume once the activity ceases. In addition, the area where the survey will take place is not known to be an important location where beluga whale congregate for feeding, calving, or nursing. Additionally, one of the mitigation measures specifically requires shut down of the airguns if a calf, or an aggregation of 5 or more beluga whales, is detected anywhere within the area where marine mammals would be expected to be behaviorally harassed by the sound levels. Furthermore, the estimated numbers of animals potentially exposed to sound levels sufficient to cause Level B harassment are low percentages of the population sizes, as illustrated above in Table 5. Therefore, the exposure of cetaceans to sounds produced by the proposed seismic survey in Cook Inlet is not anticipated to have an effect on annual rates of recruitment or survival.

Some individual pinnipeds may be exposed to sound from the proposed marine surveys more than once during the time frame of the project, but there are no known pinniped rookeries or haulouts in the vicinity of the survey site. As discussed previously, the exposure of pinnipeds to sounds produced by the proposed seismic survey in Cook Inlet is not expected to result in more than short-term Level B harassment of a low percentage of the affected species, and is not anticipated to have an effect on annual rates of recruitment or survival.

Mitigation and monitoring measures such as controlled vessel speed, dedicated marine mammal observers, non-pursuit, ramp-up, and shut downs or power downs when marine mammals are seen within defined ranges or belugas are seen in certain groupings (calf or aggregation of 5 or more) at even greater ranges will further reduce both the number and severity of behavioral impacts and minimize any potential for effects on hearing sensitivity. In all cases,

the effects are expected to be relatively short-term and limited to Level B harassment that is not expected to affect annual rates of recruitment or survival for any marine mammals.

Potential impacts to marine mammal habitat were discussed previously in this document (see the “Anticipated Effects on Habitat” section). Although some temporary acoustic disturbance is possible to food sources of marine mammals, the impacts are anticipated to be short term and minor enough (and not focused either in primary feeding areas or areas where many belugas are feeding at the time of the activity) that they would only have temporary behavioral impacts, and no lasting energetic impacts. Based on the size of Cook Inlet where feeding by marine mammals occurs versus the localized area of the marine survey activities, any missed feeding opportunities in the direct project area would be minor based on the fact that other feeding areas exist elsewhere throughout Cook Inlet.

The requested takes proposed to be authorized represent 10 percent of the Cook Inlet beluga whale population of approximately 284 animals (Hobbs et al., 2011), 0.89 percent of the combined Alaska resident stock and Gulf of Alaska, Aleutian Island and Bering Sea stock of killer whales (1,123 residents and 314 transients), and 0.06 percent of the Gulf of Alaska stock of approximately 31,046 harbor porpoises. The take requests presented for harbor seals represent 0.17 percent of the Gulf of Alaska stock of approximately 29,175 animals. Finally, the requested takes proposed for Steller sea lions represent 0.12 percent of the western DPS of approximately 41,197 animals. These percentage estimates represent small numbers relative to the affected population sizes, and they represent the percentage of each species or stock that could be taken by Level B behavioral harassment if each animal is taken only once. In addition, the mitigation and monitoring measures in the IHA are expected to reduce even further these numbers by requiring that sources shut down for aggregations of five or more whales and/or beluga calf-cow

pairs before they enter the Level B harassment take zone.

Based on the analysis contained in this notice of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that Apache's seismic survey in Cook Inlet may result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the survey will have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

Section 101(a)(5)(D) requires NMFS to determine that the authorization will not have an unmitigable adverse effect on the availability of marine mammal species or stocks for subsistence use. NMFS has defined "unmitigable adverse impact" in 50 CFR 216.103 as: an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

The subsistence harvest of marine mammals transcends the nutritional and economic values attributed to the animal and is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native artisans with materials for cultural handicrafts, and the hunting itself perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations (NOAA 2007). However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was

passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100).. That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) is below 350 whales. The next 5-year period that could allow for a harvest (2013-2017), would require the previous five-year average (2008-2012) to be above 350 whales.

There is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River.

Consistent with NMFS' implementing regulations, Apache met with the CIMMC - the marine mammal ANO that represents Cook Inlet tribes - on March 29, 2011, to discuss the proposed activities and discuss subsistence concerns. Apache also met with the Tyonek Native Corporation on November 9, 2010, and the Salamatof Native Corporation on November 22, 2010. Additional meetings were held with the Native Village of Tyonek, the Kenaitze Indian Tribe, the Knik Tribal Council, and the Ninilchik Traditional Council. According to Apache, during all these meetings, no concerns were stated regarding potential conflict with subsistence

harvest of marine mammals. Apache has identified the following features that are intended to reduce impacts to marine mammal subsistence users:

- In-water seismic activities will follow mitigation procedures to minimize effects on the behavior of marine mammals and, therefore, opportunities for harvest by Alaska Native communities;
- Regional subsistence representatives may support recording marine mammal observations along with marine mammal biologists during the monitoring programs and will receive marine mammal observation reports.

Apache concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and input from the consultations with CIMMC and Alaska Natives should result in the proposed action having no effect on the availability of marine mammals for subsistence uses. Apache and NMFS recognize the importance of ensuring that Alaska Native Organizations and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss their operations and activities.

On February 6, 2012, in response to requests for government to government consultations by the CIMMC and Native Village of Eklutna, NMFS met with representatives from these two groups and a representative from the Ninilchik. We engaged in discussions about the proposed IHA, the MMPA process for issuing an IHA, concerns regarding Cook Inlet beluga whales, and achieving greater coordination with NMFS on issues that impact tribal concerns. NMFS considered these communications before issuing its IHA.

NMFS anticipates that any effects from Apache's seismic survey on marine mammals, especially harbor seals and endangered Cook Inlet beluga whales, which are or have been taken for subsistence uses, would be short-term, site-specific, and limited to inconsequential changes

in behavior and mild stress responses. NMFS does not anticipate that the authorized taking of affected species or stocks will reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met. Therefore, NMFS has determined that the authorized taking will not have an unmitigable adverse impact on the availability of Cook Inlet marine mammal stocks for subsistence uses.

Endangered Species Act (ESA)

There are two marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area: the Cook Inlet beluga whale and western DPS of Steller sea lion. On September 2, 2011, NMFS' Permits and Conservation Division initiated consultation with NMFS' Protected Resources Division under section 7 of the ESA on the issuance of an IHA to Apache under section 101(a)(5)(D) of the MMPA for this activity. Consultation was concluded and a biological opinion issued prior to issuance of the IHA. That biological opinion determined the proposed action is not likely to jeopardize the continued existence of the Cook Inlet beluga whales or the western DPS of Steller sea lions, or to destroy or adversely modify Cook Inlet beluga whale critical habitat.

National Environmental Policy Act (NEPA)

NMFS prepared an Environmental Assessment to determine whether this proposed activity will have a significant effect on the human environment. This analysis was completed prior to the issuance of the IHA with NMFS' issuance of a Finding of No Significant Impact (FONSI).

Authorization

NMFS has issued an incidental harassment authorization for the take of marine mammals incidental to Apache's seismic survey in Cook Inlet, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 4, 2012

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